**Armatha Jordan (adapted from ) Gina DeMarco**

**Grade:** 4

**Topic:** The Water Cycle

**Time:** 30-45 minutes

My personal goal for this lesson is that my students will tie this information into their understanding of the Great Pacific Garbage Patch. This problem is huge and will not go away unless we as a society do our part and help find solutions. On a professional matter, I want to make sure I provide an opportunity for my students to be engaged in a hands on learning activity that will assist them in their understanding of the water cycle and how it works as well as spark their interest in science and make them active lifetime learners. As part of the fourth grade curriculum, students will be able to describe the water cycle. To go deeper into this process, each student will demonstrate the different stages and describe through observation how water is recycled. The main teaching point is that water is reused and recycled many times, naturally, and how water changes forms to move from one place to another.

**Summary**

Students become water molecules as they stimulate the movement of water through the water cycle.

**Objectives**

1. Students will interpret their data to be able to explain evaporation, condensation, and precipitation and their roles in the water cycle.
2. Students will be able to conclude that water does not always complete a full cycle, but can follow a multitude of pathways.

**Standards**

**Students:**

**STANDARD 1- Analysis, Inquiry, & Design:**

*Key Idea 1: The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.*

* S1.3 Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.
* S1.3a Clearly express a tentative explanation or description which can be tested

*Key Idea 3: The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.*

* S3.1 Organize observations and measurements of objects and events through classification-

and the preparation of simple charts and tables.

* S3.2 Interpret organized observations and measurements, recognizing simple patterns,

sequences, and relationships.

* S3.2a State, orally and in writing, any inferences or generalizations indicated by

the data collected

**STANDARD 7 - Connections**

*Key Idea 1:* The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision-making, design, and inquiry into

phenomena.

•analyze science/technology/society problems and issues that affect their home, school,

or community, and carry out a remedial course of action

•make informed consumer decisions by applying knowledge about the attributes of

particular products and making cost/benefit trade-offs to arrive at an optimal choice

•design solutions to problems involving a familiar and real context, investigate

related science concepts to determine the solution, and use mathematics to model, quantify, measure, and compute

•observe phenomena and evaluate them scientifically and mathematically by con-

ducting a fair test of the effect of variables and using mathematical knowledge

and technological tools to collect, analyze, and present data and conclusions

**Teacher:**

1e: Designing Coherent Instruction

* Lessons that support instructional outcomes and reflect important concepts
* Activities that represent high-level thinking
* The use of varied resources
* Thoughtfully planned learning groups
* Structured lesson plan

3c: Engaging Students in Learning

* Activities aligned with the goals of the lesson
* Student enthusiasm, interest, thinking, problem-solving, etc
* Learning tasks that require high-level student thinking and are aligned with lesson objectives
* Students highly motivated to work on all tasks and are persistent even when the tasks are challenging
* Students actively “working,” rather than watching while their teacher “works.”
* Suitable pacing of the lesson: neither dragging nor rushed, with time for closure and student reflection

**Materials**

* 7 large pieces of paper labeled with each station name and or posters will visual aids for students who may need this differentiation
* Marking pens
* 7 boxes, about 6 inches on each side or 7 die
* Copies of student worksheet
* A bell, whistle, buzzer, or some sound maker

**Connections**

Ask students to recall where water is located on the earth (oceans, rivers, ground, etc.). Ask if they recall where the most water is located (Oceans). Ask students if they know how water moves from one location to the next. Tell them this lesson will discuss how water moves between each location.

**Procedure**

1. Place the station labels around the room in different locations.
2. Ask students to identify the different places water can go as it moves through and around the earth. Write their responses on the board.
3. Tell students that they are going to become water molecules moving through the water cycle.
4. Categorize the places water can move through into seven stations: Mountain, Groundwater, Stream, Ocean, Animal, Cloud, and Plant.
5. Assign an even number of students to each station. (The cloud station can have an uneven number.) Have students identify the different places water can go from their station in the water cycle. Discuss the conditions that cause the water to move on. Explain that water movement depends on energy from the sun, electromagnetic energy, and gravity. Sometimes water will not go anywhere. After students have come up with lists, have each group share their work The die for each station can be handed to that group and they can check to see if they covered all the places water can go. The die labels provides an explanation of water movements from each station.
6. Students should discuss the form in which water moves from one location to another. Most of the movement from one station to another will take place when water is in its liquid form. However, any time water moves to the clouds, it is in the form of water vapor, with molecules moving rapidly and apart from each other.
7. Tell the students they will be demonstrating water’s movement from one location to another. When they move as liquid water, they will move in pairs, representing many water molecules together in a water drop. When they move to the clouds (evaporate), they will separate from their partners and move alone as individual water molecules. When water rains from the clouds (condenses), the students will grab a partner and move to the next location.
8. In this game, a roll of the die determines where water will go. Students line up behind the die at their station. (At the cloud station, they will line up in single file, at the rest of the stations they should line up in pairs.) Students roll the die and go to the location indicated by the label facing up. If they roll stay, they move to the back of the line. When students arrive at the next station, they get in line. When they reach the front of the line, they roll the die and move to the next station (or proceed to the back of the line if they roll stay). In the clouds, students roll the die individually, but if they leave the clouds they grab a partner (the person immediately behind them) and move to the next station; the partner does not roll the die.
9. Students should keep track of their movements. This can be done using the Incredible Journey Worksheet. Having them keep a journal to record each move they make, including stays, will also work.
10. Tell students the game will begin and end with the sound of a bell (or buzzer or whistle).

**Wrap Up/Closure**

Ask students about their journey.

* *Did anyone get frustrated because they spent most of their time at one or two stations?*
* *Do you think that water molecules often get trapped in one location (oceans or atmosphere)?*

**Extensions**

* Remind students about how pollutants or contaminants would affect our water supply and ask students how they think pollution affects the water cycle.
  + *Does pollution travel through the water cycle?*
  + *Is there any point where pollution would be deposited or left behind?*
* Discuss with students how water becomes polluted and is cleaned as it travels through the water cycle.
* Have the students make bracelets as they travel through the water cycle. Fill seven small containers with beads (one container for each station). Each station should have a specific color of bead. Give the students thread or a cord long enough for a bracelet and have them collect one bead every time they visit a station.
* Have students use their bracelets or travel records to write a story about their journey through the water cycle, i.e.: *If a water molecule could think and talk, how would it tell its story?*

**Assessment**

Teacher will circulate and monitor throughout the lesson to make informal assessments.  Use the student observations to formally assess student’s understanding according to rubric. Teacher should have a checklist with students name and an area to record the appropriate grade on the rubric to the students name.

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| **Student Understanding** | • There is evidence that the student has a **full and complete** understanding of the question or problem.  • The supporting scientific evidence is complete and demonstrates a full integration of scientific concepts, principles, and/or skills. | • There is evidence that the student has a **general** understanding of the question or problem.  • The supporting scientific evidence is generally complete with some integration of scientific concepts, principles, and/or skills. | • There is evidence that the student has **minimal** understanding of the question or problem.  • The supporting scientific evidence is minimal. | • There is evidence that the student has **no** understanding of the question or problem. |
| **Student Response** | The response reflects a complete synthesis of information, such as data, cause-effect relationships, or other collected evidence. | The response reflects some synthesis of information, such as data, cause-effect relationships, or other collected evidence. | The response provides little or no synthesis of information, such as data, cause-effect relationships, or other collected evidence. | The response is completely incorrect or irrelevant or there is no response. |
| **Terminology** | The accurate use of scientific terminology strengthens the response. | The accurate use of scientific terminology is present in the response. | The accurate use of scientific terminology may not be present in the response. | The accurate use of scientific terminology may not be present in the response. |
| **Application of Knowledge** | An effective application of the concept to a practical problem or real-world situation reveals a complete understanding of the scientific principles. | An application of the concept to a practical problem or real-world situation reveals a general understanding of the scientific principles. | An application, if attempted, is minimal. | An application, if attempted, is minimal. |